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# Lodgepole Pine

## An American Wood

This widespread species grows throughout the Western States and Canada from Alaska to Mexico. In the past, the lumber industry ignored the lodgepole pine tree because of its relatively small size, but today the species is an important lumber source in the Northern Rocky Mountain region. It is extensively used for light-construction framing, paneling, posts, and poles. The wood is moderately lightweight, easily dried, easily worked with tools, and glues well. It is not durable when exposed to conditions favorable for decay fungi, but the sapwood readily takes preservative treatment.

F-520858

# Lodgepole Pine
(*Pinus contorta* Dougl. ex Loud.)

David P. Lowery[1]

## Distribution

Taxonomists have distinguished four geographical varieties of *Pinus contorta* Dougl. ex Loud.—var. *contorta*, which is found along the Pacific Coast from Alaska to northern California; var. *bolanderi* (Parl.) Vasey, which is a shrub local in Mendocino County, Calif.; var. *murrayana* (Grev. and Balf.) Engelm., which grows in the Cascade Mountains of Oregon and Washington and the Sierra Nevada Mountains of California; and var. *latifolia* Engelm., which is the most widespread variety, with a range extending from the central Yukon through the Rocky Mountains into Colorado and the Black Hills of South Dakota (fig. 1). Although var. *murrayana* contributes somewhat to sawtimber producton, var. *latifolia* is the principal source of lodgepole pine timber. Except where noted, the following discussion pertains to the *latifolia* variety.

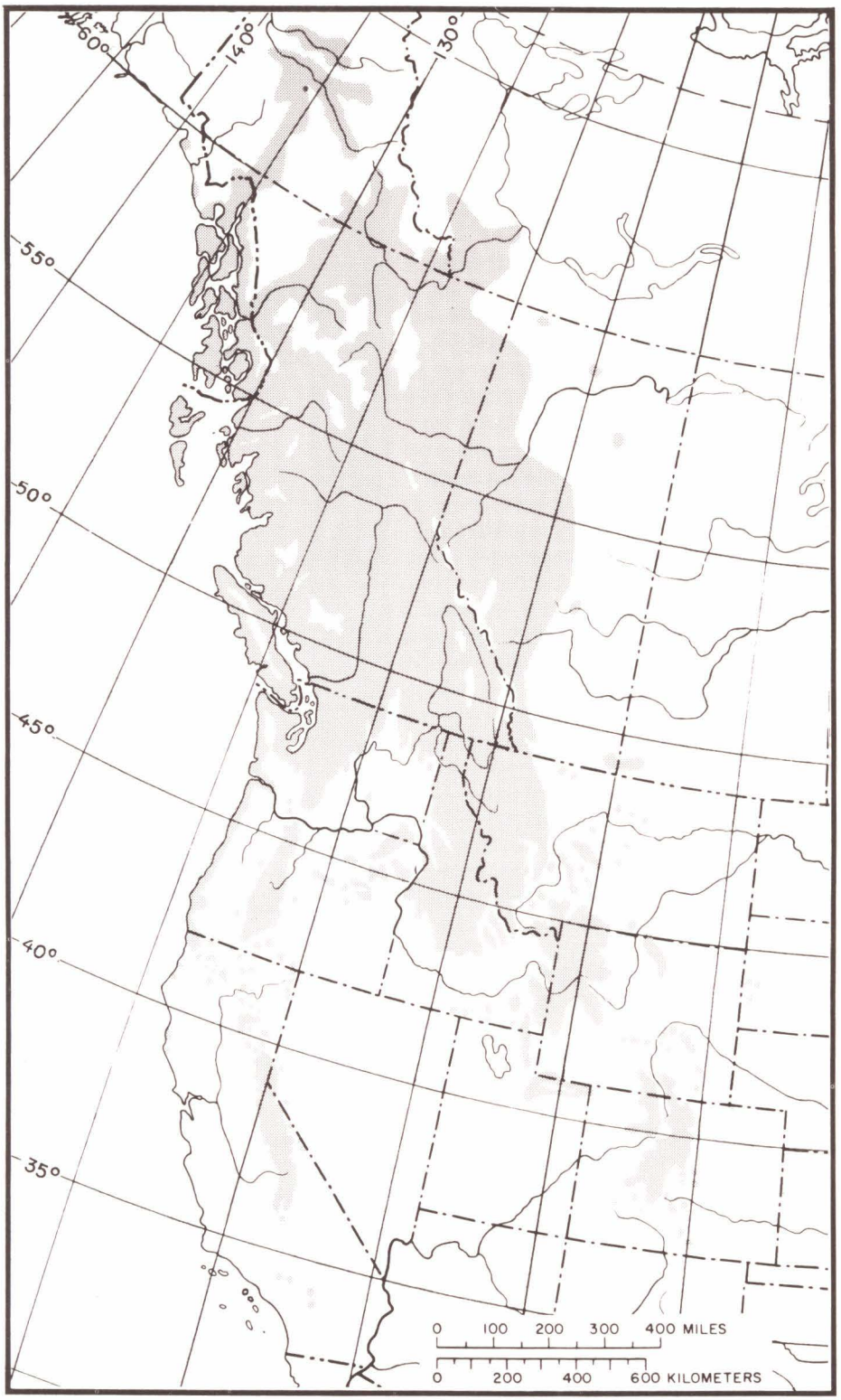


**Figure 1—The ranges of the three principal lodgepole pine varieties in North America.** F-532740

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## Description and Growth

Needles usually occur in pairs and sometimes singly. They are 1 to 3 inches long, often twisted, and dark green (coastal form) to yellow green (inland form). Cones are about 2 inches long, ovoid, and asymmetrical at the base. They occasionally open at maturity, but more commonly remain closed for 10 to 20 years. The ends of the cone scales are light yellowish brown, often with a recurved prickle. Bark of coastal trees is about an inch thick and is fissured; on inland trees the bark is thinner, scaly, and orange brown to gray in color (fig. 2).

Lodgepole pine grows on a variety of soils, some of which are too poor to support other tree species. Best growth is attained on well-drained, slightly acidic, sandy or gravelly loams. The coastal form of lodgepole pine grows from near sea level to an altitude of about 2,000 feet. The inland form occurs at elevations from 1,500 to 11,500 feet. The species grows especially well on northern and eastern aspects on gentle slopes and in basins, but is found on all types of terrain and on all aspects.

Lodgepole pine produces some seed virtually every year and has good crops at 1- to 3-year intervals. Mature, serotinous (late opening) cones on the inland pine form open and release seed when temperatures reach or exceed 113° F (45° C); these temperatures may be caused by fire or solar radiation. Viable seeds have been extracted from 80-year-old closed cones. When conditions favor cone opening, as in wildfires or controlled burns, lodgepole pine is likely to regenerate too abundantly, resulting in young, stagnated stands. As many as 300,000 1-year-old seedlings have been found on a single acre, and as many as 175,000 8-year-old trees, averaging about 2 feet high, have been found on an acre.

Mature lodgepole pine varies greatly in size. In the moist Sierra Nevada Mountains of California, trees reach average breast high diameters (4.5 feet from the ground) of 15 to 18 inches and heights of 90 to 100 feet in 100 years. In eastern Oregon, trees 100 years old average 7 to 13 inches in

Figure 2—Typical bark, needles, and closed cones of lodgepole pine. F-312661

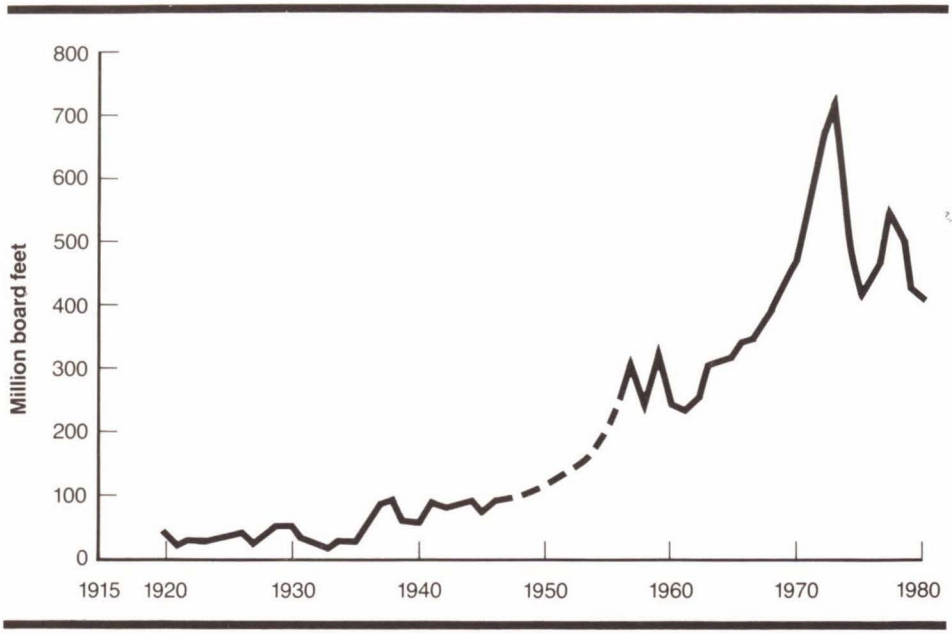


**Figure 3—Production of lodgepole pine lumber, 1920–80.**

diameter and 70 to 80 feet in height. The species is relatively long lived. Trees as old as 600 years have been reported, and old-growth stands may be older than 200 years. Properly managed and thinned stands can yield sawtimber volumes of 23,000 board feet per acre at rotation age of 120 years, in contrast to unmanaged stands on similar sites that yield only 6,000 board feet per acre. The species is shade intolerant, and it responds well to cultural practices such as thinning. Clearcutting is the usual harvesting method used. Best seed germination occurs in full sunlight and on mineral soil or disturbed duff free of brush. Partial cutting of the stand generally reduces germination and survival.

Lodgepole pine is represented in many forest types. At high elevations, it grows with Engelmann spruce (*Picea engelmannii*), subalpine fir (*Abies lasiocarpa*), red fir (*A. magnifica*), and whitebark pine (*Pinus albicaulis*). At lower elevations, it is found with Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), western white pine (*Pinus monticola*), western larch (*Larix occidentalis*), and other conifers.

### Common Names

Lodgepole pine is the most commonly used name for the inland varieties of the species, but it is also called black pine and tamarack pine. The coastal variety may be referred to as scrub, shore, coast, or beach pine.

### Related Commercial Species

Occasionally, lodgepole pine is marketed in mixtures with ponderosa pine, Engelmann spruce, and subalpine fir.

### Supply

The total stand of lodgepole pine of sawtimber size in the United States in 1977 was estimated to be 71.4 billion board feet. Net volume of growing stock, including smaller trees, was estimated at 26.4 billion cubic feet. These volumes grow chiefly on an estimated 12.7 million acres of commercial forest lands classified as lodgepole pine type. About 57 percent of the sawtimber volume is in the Northern Rocky Mountain region, 16 percent is in the Southern Rocky Mountain region, 21 percent is in the Pacific Northwest region, and 6 percent is in the Pacific Southwest region. Montana has the greatest volume of lodgepole pine sawtimber and is followed, in decreasing order of volume, by Colorado, Wyoming, Oregon, Idaho, Utah, California, Washington, Alaska, and Nevada.

### Production

The production of lodgepole pine lumber and round products has increased steadily since 1945 after a half century of relatively little use (fig. 3). The maximum lumber production occurred in 1973, when about 705 million board feet were sawed.

The relatively small diameter and little taper of lodgepole pine trees make them ideal for use in the round as house logs, poles, posts, and fence rails and also as firewood. In the Rocky Mountain region, sawtimber-sized trees killed by the mountain pine beetle (*Dendroctonus ponderosae* Hopk.) are preferred by log home manufacturers because these logs are usually sufficiently dry and ready for immediate use. Lodgepole pine is also much in demand for poles less than 45 feet in length. Tremendous numbers of fenceposts are also produced each year. Lodgepole pine is used locally for fence and corral rails. The stem size is ideal for burning in fireplaces as no splitting is needed.

During and after World War II, lodgepole pine pulp bolts from the Rocky Mountains were shipped to pulp mills in the Lake States. Although such shipments have essentially been discontinued, pulp chips made from sawmill residue are used extensively by papermills throughout the West, and some carloads have been sent to mills in the Lake States.

Lodgepole pine is highly susceptible to attack by numerous destructive insects and diseases, thus decreasing production. The mountain pine beetle ranks first in destructiveness, often eliminating mature trees over extensive areas. The lodgepole pine beetle (*D. murrayanae*) attacks and may kill overmature, injured, and weakened trees.

Other bark beetles of the genus *Ips* are frequent associates of *Dendroctonus* beetles and may also be responsible for killing trees. The lodgepole needle miner (*Coleotechnites milleri*) is a serious foliage insect, and a budworm (*Choristoneura lambertiana*) has top-killed lodgepole pine in Montana.

The most serious disease of lodgepole pine is caused by a dwarf mistletoe (*Arceuthobium americanum*). In addition, a stem blister rust (*Cronartium comandrae*) has been an important disease as have been a shoestring root rot (*Armillariella mellea*), a white pocketrot (*Heterobasidion annosum*), and brown cubical rots (*Inonotus tomentosus* and *Phaeolus schweinitzii*).

Because of its thin bark, lodgepole pine is easily killed by fire. It is generally not windfirm, and overly dense stands of small-stemmed trees may be damaged by heavy snow and ice. Porcupines can severely damage young trees.

**Characteristics and Properties**

The narrow sapwood is nearly white to pale yellow. The heartwood is light yellow to pale yellowish brown, often scarcely darker than the sapwood, and not distinct. The wood has a resinous odor, especially when green, but has no characteristic taste. It is generally straight grained, medium-fine in texture, and prominently dimpled on the split tangential surface. The wood is moderately light in weight, moderately soft, moderately weak in bending and edgewise compression, moderately low in shock resistance, easy to work with tools, easy to glue, and average in paint-holding ability. The wood holds nails or screws moderately well, shrinks appreciably, and seasons easily. It is not durable under conditions that favor decay and should be treated with a preservative when so used. Its weight, strength, shinkage, and hardness are most nearly comparable to these properties in ponderosa pine. The specific gravity, based on green volume and ovendry weight, is approximately 0.38; the density is about 27 pounds per cubic foot at 12 percent moisture content.

Lodgepole pine dimension stock is important in light-frame construction for studs and truss members. Boards are used for cabinetry, shelving, and knotty pine paneling. Because of its fine drying and gluing characteristics, the lumber can be edge-glued into panels of fairly large size, and short pieces are end-glued to longer lengths.

Since lodgepole pine trees retain most of their limbs, the sawn lumber contains knots; but since limb size is generally small, so are the knots. When sawn in 1-inch boards, about 85 percent of the lumber is graded No. 3 common or better. When sawn as 2-inch dimension, about 85 percent is graded standard or better.

In most areas, lodgepole pine grows straight with relatively little taper, but spiral grain may occur in some trees. Since the sapwood readily takes preservative treatment by all commercial methods, the species is widely used for telephone or transmission poles and fenceposts.

Historically, lodgepole pine has been a favorite species for use in shaft mining. The change in mining technology has reduced this market, but a sizable quantity of mine timbers is still produced.

The species is also used to a limited extent in the manufacture of veneer and plywood.

**Principal Uses**

Lodgepole pine was once used primarily for railroad ties; mine timbers; and locally for lumber, house logs, or rough construction. Today, it is marketed worldwide as well-manufactured lumber, both in board and dimension forms, and especially as 8-foot studs. It is particularly valued for knotty pine paneling because of its uniform color; small, tight knots; and dimpled effect. When edge-glued, it is used for shelving, other cabinet work, or interior finish. It is used extensively for fenceposts, corral rails, transmission or telephone poles, and house logs. Limited uses include veneer and plywood, pulpwood, and firewood.

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